Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Advanced Television Systems and Their Impact on the Existing Broadcast Service	)	MM Docket No. 87-268
	)	
Review of Technical and Operational Requirements: Part 73-E, Television Broadcast Stations	)	
	)	
Reevaluation of the UHF Television Channel and Distance Separation Requirements of Part 73 of the Commission's Rules	)	

SUPPLEMENTAL COMMENTS OF MST

Pursuant to Section 1.45 (c) of the Commission's Rules, the Association of Maximum Service Telecasters, Inc. ("MST") hereby respectfully requests that the Commission accept this supplemental filing to augment and balance the Commission's record with regard to the technical accuracy and validity of a study concerning the availability of UHF spectrum for additional broadcast and land mobile radio use submitted by the Mobile Communications Division of Telecommunications Industry Association ("TIA"). Reply Comments of TIA (Jan. 23, 1989).

I. The TIA Study Is An Ill-Advised Effort To Circumvent The Careful And Systematic Spectrum-Use Investigation Being Conducted By The Advisory Committee.

For over a year, the Planning Subcommittee of the FCC's ATV Advisory Committee has had a working party analyzing the potential capacity of the VHF and UHF television band to accommodate additional broadcast signals and other users. This working party, Working Party 3, has worked closely with the Commission and has had the benefit of comprehensive computer-generated spectrum analyses produced by the Commission and described in the Commission's Tentative Decision in this docket. Tentative Decision and Further Notice of Inquiry, Docket No. 87-268, 3 F.C.C. Rcd. 6520, 6527 (1988). Members of the working party have devoted literally thousands of man-hours to conducting these systematic and in-depth analyses of the possibilities for more efficient use of these bands.

The TIA has not participated in the Working Party deliberations[1/] Nor, prior to the Reply Comments in the Tentative Decision, has the TIA seen fit to place any information in this docket which would advance the efforts of the Advisory Committee.

1/ However one of TIA's prominent members, Motorola, has participated in WP3 activities.

Rather, at the reply comment stage, apparently in hopes that other parties would be in some fashion precluded from even commenting upon its efforts, the TIA has provided the Commission with its own independent UHF spectrum study. This study apparently in preparation for more than a year, was conducted without any notice to or input from the Advisory Committee. Its release at this juncture, with its claims of abundant spectrum for land mobile at no sacrifice whatsoever to broadcasting, is a calculated effort to subvert and undermine the Advisory Committee's exhaustive efforts.

In any event, as detailed below, the TIA study contains many gross flaws, flaws which render its conclusions largely, if not entirely, useless. These errors could have been rectified at a far earlier point if TIA had chosen to participate positively and constructively in the Advisory Committee process.

II. The TIA Study Is Based On Incomplete And Inaccurate Information.

The TIA studies purport to show that all existing television licensees and permittees could be provided with the spectrum necessary to implement ATV, and leave between 48 Mhz and 174 Mhz of spectrum available in the UHF band (depending on how ATV is implemented) for reassignment to land mobile. According to TIA, "the Commission has an opportunity in this proceeding to achieve a 'win-win'" situation. Reply Comments of TIA at 3.

However, studies conducted by Working Party 3 of the FCC Advisory Committee's Planning Subcommittee came to a much different conclusion. Those studies show that nearly all existing stations can be provided with supplemental spectrum within the VHF and UHF bands only if taboos can be eliminated and the co-channel separations can be reduced to approximately 160 km (100 miles). The PS/WP3 studies have also concluded that repacking would yield only a small amount of additional spectrum.

The more optimistic conclusions of the TIA study are, unfortunately, based on incorrect and incomplete information. The specific inaccuracies of the TIA study are discussed in more detail in the following paragraphs.

A. The TIA study did not consider all existing stations, construction permits and pending applications.

TIA used an FCC data base that is approximately 16 months old (September 1987). The data base was "modified" and ultimately included 1584 U.S. television stations. In contrast, the data base used in the FCC and MST studies contained 1760 stations, i.e., the TIA data base excluded 176 stations and/or pending applications.

In particular, a total of 13 stations (one station in Vermont, three in New York, two in New Jersey, three in West Virginia, and four in Virginia) were left out of TIA's northeast corridor analysis. Engineering Statement at 3

(Attachment 1). Because of the crowded conditions in the television bands along the East Coast, omission of these stations would severely skew the accommodation statistics in favor of higher ATV accommodations.

B. **The TIA study did not consider the impact of existing stations in neighboring countries.**

The accommodation statistics reported by TIA excluded the effect of existing Canadian stations. TIA Reply at 6. This exclusion would again skew the accommodation statistics in favor of higher ATV accommodations. In fact, the FCC Advisory Committee conducted a number of studies relating to the effect of Canadian stations on the availability of additional spectrum and determined that depending on the co-channel separation distance, the accommodation statistics could vary as much as 7 percent. This can create a "ripple" effect that can influence stations hundreds of miles from the U.S.-Canada border. Engineering Statement at 4. A similar situation involving stations in Mexico will affect allotment all across the southern tier of the United States.

C. **The TIA study did not consider the impact of existing stations in neighboring states.**

The TIA study treated the 14-state study area in the northeastern United States as if it were an isolated island. It did not consider whether its hypothetical station assignments would be fully spaced to stations outside the

study area. This methodology can lead to unduly optimistic results. The FCC Advisory Committee discovered that the proportion of stations that could be accommodated dropped sharply when a national, rather than a regional, database was used. Engineering Statement at 4-5.

D. **The TIA study did not use realistic co-channel distance separations.**

The TIA study used co-channel separation distances furnished by Zenith. Zenith has since determined, however, that these separations were based on an inappropriate D/U ratio, and has now filed a corrective amendment with the Advisory Committee (Attachment 2). Zenith now requires separations of 80 to 95 miles for interference-free performances, rather than 67 to 87 miles. Separations must be less than 100 miles to accommodate all stations with a simulcast channel.

Although Zenith still estimates that it can accommodate all existing television stations with supplemental spectrum, the revised separations do not leave a significant amount of spectrum for sharing by land mobile. Moreover, MST believes that even if TIA's figures were adjusted to correct this particular error, they are still be subject to field-testing to determine if the various systems can meet Zenith's projected performance specifications. Any spectrum decision based on these hypothetical numbers is grossly premature.

In addition, the TIA study assumes the elimination of all UHF taboos. Such a simplifying assumption is justifiable only for purposes of preliminary analysis. Spectrum allocation decisions based on these assumptions are simply premature. To date, even experimental receivers have not completely overcome the need for taboos, much less does this assumption accommodate the existing receivers that will remain in use for many years to come. Engineering Statement at 6.

III. The TIA Spectrum Options Are Flawed And Self-Serving.

The TIA study analyzes four options for implementation of ATV. The first two options assume that ATV will be implemented in existing 6 Mhz channels, either with or without repacking of stations. The other two options assume that ATV will begin as a simulcast service using a highly efficient 6 Mhz approach such as the one proposed by Zenith. Once again, TIA analyzes this approach both with and without repacking. In each case TIA concludes not only that there is enough spectrum in the TV bands for all existing television stations to provide ATV service but that there would be substantial additional spectrum available for mobile radio. Reply Comments of TIA at 6-7.

The TIA analyses of each of the four options is seriously flawed. The first option is merely to implement ATV within current channel assignments. It is not dependent on

the TIA study. It is merely the status quo. Its only effect is to revive the land mobile/TV sharing controversy of Docket No. 85-172. The Commission has deferred action on the proposals in that proceeding until sufficient information becomes available from the work of the Advisory Committee and others to determine the quality and interference characteristics of proposed ATV transmission systems. It is still far from clear that 6 Mhz systems can provide a competitive level of picture and sound quality, and still be resistant enough to interference, and benign enough to other signals, to enable broadcasters to maintain their service areas. Engineering Statement at 2. Thus, decision regarding this option is premature.

The second option is also based on 6 Mhz NTSC-compatible ATV systems, but would repack stations into the upper UHF spectrum. Its only purpose is to free spectrum for land mobile at the expense of disrupting existing broadcast operations. Advisory Committee studies have found that repacking creates more disruption than it does additional spectrum, casting serious doubt on this approach. It is noteworthy that TIA would spare land mobile licensees this disruption. The repacking options assume that only television stations will be repacked, but that land mobile operations now sharing the UHF band will remain undisturbed.

The third option assumes the use of a Zenith-type simulcast system. This option is one that is currently being investigated by the FCC Advisory Committee and may well supply a way to provide all existing stations with extra spectrum for HDTV. However, given the unrealistic co-channel separations distances used by TIA and the other problems discussed above, the TIA findings are incomplete and inaccurate. They certainly do not demonstrate that this approach could accommodate HDTV and still allow extensive sharing of the UHF band by land mobile. On the contrary, early Advisory Committee study indicates that even if Zenith or similar systems achieve their projected performancy there will be barely enough spectrum in the current broadcast bands for all stations.

The last option uses a Zenith-type simulcast system with repacking. It suffers from the same problems as the previous option. In addition, like the other repacking scenario, its goal is to free more spectrum for land mobile at the expense of disrupting existing broadcast operations. And like the other repacking scenario, the meager spectrum benefits do not justify the considerable cost in dislocation. Broadcasters do not regard forcing their viewers to endure disruptions of this kind as a "win-win" situation.

The spectrum options presented by TIA only serve to add confusion to the already complex spectrum availability

issue. By only presenting a limited number of severely biased scenarios, TIA distorts and oversimplifies the true situation with regard to availability of spectrum within the existing broadcast bands.

CONCLUSION

The TIA studies, and the analysis based upon those studies, are flawed by inaccurate and incomplete information. Neither the TIA studies nor the spectrum work completed to date by the FCC or the Advisory Committee support the claim that the VHF and UHF bands can support both ATV service by all existing stations, and expanded land mobile sharing of the television band. If TIA is genuinely interested in studying this issue, it could do so more productively by working in cooperation with the Advisory Committee, rather than attempting to disrupt and undermine the committee's work with ill-conceived and self-serving studies of this kind.

Respectfully submitted,

THE ASSOCIATION OF MAXIMUM SERVICE TELECASTERS

Gregory M. Schmidt
Martin Wald

Covington & Burling
1201 Pennsylvania Avenue N.W.
P.O. Box 7566
Washington, D.C. 20044

Its Attorneys

April 26, 1988

JULES COHEN & ASSOCIATES, P.C.
CONSULTING ELECTRONICS ENGINEERS
WASHINGTON, D.C. 20036

ENGINEERING CRITIQUE PREPARED ON BEHALF OF THE ASSOCIATION OF MAXIMUM SERVICE TELECASTERS, INC. OF THE REPACKING ANALYSIS SUBMITTED BY THE MOBILE COMMUNICATIONS DIVISION OF THE TELECOMMUNICATIONS INDUSTRY ASSOCIATION MM DOCKET NO. 87-268

Jules Cohen says that he is consultant to the firm of Jules Cohen & Associates, P.C., consulting electronics engineers, that he is a professional engineer registered in the District of Columbia and Commonwealth of Virginia, and that his qualifications in engineering matters are well known to the Federal Communications Commission. This statement, prepared on behalf of the Association of Maximum Service Telecasters, Inc. ("MST"), is a critique of the television broadcasting channel repacking analysis submitted as Reply Comments in MM Docket No. 87-268 by the Mobile Communications Division of the Telecommunications Industry Association ("TIA").

The TIA alleged in its Reply Comments that four options are available to the FCC:[1/] (1) ATV can be implemented with no spectrum implications and Docket 85-172 sharing proposals can "move forward immediately." (2) Repacking the UHF television band upward can provide an additional 6 MHz for simulcasting of each television station and free 96 MHz of spectrum for land mobile. (3) Repacking the UHF television band downward can provide an additional 6 MHz for simulcasting of each television station and free 48 MHz for land mobile. (4) Ultimately, when NTSC broadcasting is phased out, 168 or 174 MHz of the present television broadcast spectrum can be reassigned.

1/ Reply Comments of the Mobile Communications Division of the Telecommunications Industry Association in Response to Tentative Decision and Further Notice of Inquiry; MM Docket No. 87-268; Executive Summary, page 2.

As described more fully below, the options are either premature and not ripe for Commission action or are based on a seriously flawed spectrum analysis.

The suggestion that proposals for improved (not necessarily true ATV systems) provide an option to move forward immediately with further band sharing fails on two counts. At this time, prior to testing any proponent's system, neither the television industry nor the Commission can know whether a compatible[2/] system contained entirely within the present 6 MHz assignments could provide sufficient improvement to satisfy the need of the television broadcast industry for a system that will remain competitive in quality with other delivery media. Furthermore, if such a system can be found, will it be able to deliver its superior performance applying not just present criteria for interference from other television stations and from land mobile operations but also the capability of eliminating current taboo restrictions? That question cannot be answered until the system is subjected to rigorous testing.

Repacking studies offered by the TIA are based on inaccurate and incomplete information of sufficient magnitude that they are worthless for drawing even tentative conclusions. The data base used was incomplete. The studies failed to consider the impact of Canadian assignments. The studies did not consider the impact of existing assignments in neighboring states. The studies did not use realistic cochannel distance separations. Finally, the studies assumed the elimination of all taboos, even for NTSC-to-NTSC interference considerations, with no appropriate basis for assuming that such elimination would not result in serious interference to television viewers.

2/ Herein, "compatible" is used in the sense of permitting reception by existing NTSC receivers with no impairment of picture quality.

In the northeastern states included in the TIA data base, thirteen assignments were omitted, all of which had been used in Commission studies relied upon by Working Party 3 of the Advisory Committee's Planning Subcommittee. A check of current Commission records shows the following with respect to the omitted assignments:

Location	Channel	Remarks
Batavia, NY	51	Genessee Communications, Inc. holds CP (BPCT-851017KI)
Bath, NY	14	William H. Walker, III holds CP (BPCT-870331LW)
Corning, NY	48	Rural New York Broadcasting holds CP (BPCT-870610KM)
Blacksburg, VA	65	Southwest Virginia Television holds CP (BPCT-860212KL)
Charlottesville, VA	64	Lindsay Television, Inc. holds CP (BPCT-860410KQ)
Danville, VA	24	Danville Communications (WPAJ) holds CP (BPCT-8703318K)
Danville, VA	44	AW Broadcasting holds CP (BPCT-870317KP)
Bluefield, WV	40	Living Faith Ministries, Inc. holds CP (BPCT-860529KF)
Charleston, WV	29	P. S. A., Inc. holds CP (BPCT-870121KN)
Martinsburg, WV	60	Ralph Abertazzie holds CP (BPCT-870602KK)
Burlington, VT	44	Eight applicants have been designated for hearing (MM Docket No. 88-352)
Atlantic City, NJ	62	Four applicants have been designated for hearing (MM Docket No. 86-332)
Newton, NJ	63	Mountain Broadcasting Corp. holds CP (BPCT-850828LA)

Further evidence of the incomplete nature of the TIA data base lies in the fact that the "modified data base" for the entire country included only 1584 assignments.[3/] The data base used for the Commission studies, and relied upon by Planning Subcommittee Working Party 3, included 1760 assignments for the entire country.[4/]

Omission of Canadian assignments by the TIA affects the results obtained significantly. That result is not confined to the immediate vicinity of the Canadian border. A "ripple" effect is produced when restrictions must be placed on channel availabilities near the border. Eliminating from consideration a number of channels near the border requires the use of channels which could be used otherwise in the next tier of stations. That effect can penetrate as far as Baltimore, and consideration of the impact of Mexican assignments can even influence the Miami area.

The TIA work omitted consideration of television assignments outside the 14-state area studied. Early work performed under the auspices of Working Party 3 of the ATV Planning Subcommittee, employing a data base including only northeastern area television station assignments, illustrated the errors introduced by failing to take into account assignments in locations outside the specific study area. In that work, the data base included all assignments (178) within a 220-mile radius of a point just south of Staten Island. To gauge the magnitude of likely error introduced by omission of assignments beyond the 220-mile radius, a subset of assignments within 80 miles of the reference point was analyzed. That subset included 36 stations. Results were included in the first interim report of the working party.

3/ TIA Reply Comments, Appendix 1, page 1.

4/ ATV Advisory Committee Document PS/WP-3-0050, 3 August 1988.

Tabulations of the results of the work involving the 178- and 36-station data bases cannot be compared directly with more recent work performed because desired-to-undesired (D/U) ratios were used with different distance separations for VHF and UHF bands corresponding to those ratios. However, the results serve to illustrate the errors resulting from omission of separations to stations outside the study area. For 12 dB cochannel D/U ratio and -6 dB first adjacent channel D/U ratio, the 220-mile study showed that 84.3 percent of the total number of stations could be accommodated with 3-MHz supplemental channels.[5/] When only the 80-mile radius was considered, thus taking into account the effect of assignments beyond 80 miles, the percent accommodation dropped to 58.3 percent.[6/] For 6-MHz supplemental channels and the same D/U ratios, the accommodation dropped from 69.7 percent to 36.1 percent.[7/]

The TIA used cochannel separation distances of 78.9, 87.0, and 67.7 miles for low band VHF, high band VHF and UHF, respectively.[8/] The foregoing separations were taken from work by Zenith[9/] (TIA used those separations for both HDTV-to-HDTV and HDTV-to-NTSC although Zenith had applied them only for HDTV-to-NTSC). Zenith had, in turn, employed the study reported in the work of Working Party 3 of the Planning

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5/ Report of the Spectrum Utilization and Alternatives Working Party of the Planning Subcommittee of the Advisory Committee on Advanced Television; Document No. PS/WP-3-0040, 17 April 1988; page 20, Table IVA.

6/ Ibid, Table IVB.

7/ Ibid, page 22, Tables VIA and VIB.

8/ Appendix 1, page 2.

9/ Zenith Spectrum Compatible HDTV System; Submission by Zenith Electronics Corporation to SS/WP-1 of FCC Advisory Committee on ATV; September 1, 1988; page 14.

Subcommittee.[10/] The separations so derived for a 0 dB cochannel D/U ratio are not appropriate. Working Party 3, in developing the relationship between D/U ratios and distance separations had applied a 4 dB reduction to the undesired signal.[11/] That adjustment, appropriate for the particular conditions assumed by the Working Party, was not appropriate for the Zenith analysis. (Zenith is supplying a corrective amendment to its submission.)

As in preliminary information developed by Working Party 3, TIA omitted consideration of all taboos now applied to UHF allotments. However, unlike the Working Party, TIA assumed, without reservation, that all taboos could be eliminated. Such elimination was claimed to be applicable to NTSC as well as ATV systems.[12/] Justification for such disregard of taboos for NTSC was given on the basis of an Hitachi submission to Working Party 3.[13/] Even if all television sets subsequently manufactured were to use the Hitachi tuner (a highly doubtful assumption), and assuming further that the reported Hitachi results were independently verified, the image taboos would still be required. Hitachi makes no claim for any improvement in image rejection. Of all the taboos, image remains the one least likely to be eliminated by changes in receiver design. As to other taboos, the existing population of receivers must be taken into account and, until actual testing of improved receivers is

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10/ Preliminary Analysis of VHF and UHF Spectrum Scenarios; Document No. PS/WP3-57; Table 6.

11/ Report of the Spectrum Utilization and Alternatives Working Party: Document No. PS/WP3-0040; 17 April 1988; page 7.

12/ Appendix 2, page 2.

13/ A High Immunity Tuner with GaAs IC; Hitachi Sales Corporation of America; Enclosure to November 10, 1988, letter from Kei Yamashita to Mr. Bruce Franca; Document No. PS/WP3-0067.

accomplished, few can be eliminated with confidence that the results will be satisfactory.

In consideration of the foregoing, no credence can be attached to the TIA studies.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on April 24, 1989.

Jules Cohen, P.E.

ZENITH

ZENITH ELECTRONICS CORPORATION □ 1000 MILWAUKEE AVENUE □ GLENVIEW, ILLINOIS 60025-2493

WAYNE C. LUPLOW
EXECUTIVE DIRECTOR
ELECTRONIC SYSTEMS R&D
AND ENGINEERING SERVICES
[illegible]
TELEX [illegible]

DATE: April 18, 1989

TO: MEMBERS OF SS/WP1 OF THE FCC'S ADVISORY COMMITTEE ON ADVANCED TELEVISION SERVICE AND OTHER INTERESTED PEOPLE

SUBJECT: CORRECTION TO THE ZENITH "SPECTRUM COMPATIBLE HDTV SYSTEM DESCRIPTION DATED SEPTEMBER 1, 1988."

Please substitute the enclosed page 14 REV. for the existing page 14 of the September 1 document by Zenith Electronics Corporation.

References to footnotes 2 and 3 have been put in the proper place.

Zenith's definition of D/U ratio, which is now also commonly used in PS/WP3 of the ATS Advisory Committee, is based on NTSC equivalent signals and makes no assumptions about the ATV signal. The definition used in the cited reference 2, which was written at an earlier stage of PS/WP3's activities, includes a 4dB reduction in ATV signal power because of the assumed absence of the NTSC synchronization signal. This difference in D/U ratio was inadvertently overlooked, and thus the attached correction is requested to be substituted.

As the Zenith Spectrum Compatible HDTV System can operate without adjacent channel restrictions, 160 km minimum spacing will thus provide near 100% accommodation.

WAYNE LUPLOW

WCL/o

Enclosure

REVISION TO 9-1-88 ZENITH SPECTRUM COMPATIBLE HDTV SYSTEM PROPOSAL

2.3 MEASURED PERFORMANCE

Laboratory tests of R.F. of parts of the system, believed to be conservatively representative of the interference performance of the complete HDTV system, have demonstrated the following results in tests conducted to evaluate interference by HDTV into NTSC.[1]

Also included for comparison are U/D ratios for thresholds of perceptible interference from NTSC into NTSC for the particular Taboos. These data are derived from the 1987 FCC Report FCC/OET TM-1 by Hector Davis.

2.3.1 COCHANNEL INTERFERENCE

The threshold of perceptible interference at the NTSC receiver occurred at undesired HDTV to desired NTSC signal levels at the input of the receiver of -6 dB.

For 6 dB front-to-back ratio of the receiving antenna this corresponds to 0 dB field strength ratio, which in turn requires a minimum cochannel separation of 145 km at Low VHF, 153 km at High VHF and 127 km at UHF.[2] Without adjacent channel restrictions, 160 km separation results in 99.7% of all present broadcast licensees being accommodated with an additional available 6 MHz channel.[3]

1/ Undesired to Desired (U/D) signal ratios for HDTV are based on calibration of the HDTV signal in reference to the NTSC signal for equivalent signal-to-noise ratios.
2/ See PS/WP3-0051, "Spectrum Allocation Studies, Station Separations and Desired to Undesired Ratios."
3/ See Table 6 PS/WP3-57, "Preliminary Analysis of VHF and UHF Spectrum Scenarios."